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TITLE: Rotor bearing for motor-pump set - has bearing
socket with elastic
bearing cap over shaft end

PATENT-ASSIGNEE: EHEIM G[EHEII]

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ABSTRACTED-PUB-NO: DE 2264934A

BASIC-ABSTRACT: The rotor bearing, for a motor-pump set,
has the rotor (4) of
the motor (1) mounted rotatably in a cylindrical, cap-like
socket (7) open at
one end. The socket seals with the housing (6) enclosing
the motor's stator
(5). The rotor is mounted in two elastic bearings (30),
one in the bottom of
the cap-like socket, and the other in the cover cap that
closes the pump
chamber at the opposite end of the shaft from the socket.
The rotor is mounted
on the same shaft as the pump vanes. Each elastic bearing
is hollow and closed
at its outer end.

TITLE-TERMS:

ROTOR BEARING MOTOR PUMP SET BEARING SOCKET ELASTIC BEARING
CAP DE 2264934B
SHAFT END

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Lagerung des Rotors eines Motorpumpenaggregats

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Anmelder:

Eheim, Gunther, 7301 Deizisau

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Erfinder:

Nichtnennung beantragt

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ORIGINAL INSPECTED

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Patentanwält Dipl.-Ing. W. Scherzmann Dr.-Ing. R. Rüger

7300 Esslingen (Neckar), Fabrikstraße 24, Postfach 348

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PA 9 Tr.A.I rüku

Telefon
Stuttgart (07 11) 35 65 39
35 96 19

Telex 07256610 smru

Telegramme Patentschutz
Esslingenneckar

Herr Ing. Gunther Eheim, 7301 Deizisau üb. Esslingen/N.

Plochinger Str. 32

Lagerung des Rotors eines
Motorpumpenaggregats

Die Erfindung betrifft ein Motorpumpenaggregat mit einem in einem Kunststoffgehäuse angeordneten Elektromotor und einem in einer an dem Motorgehäuse angeformten Pumpenkammer umlaufenden Pumpenrad, das mit dem in zwei fluchtenden Lagern drehbar gelagerten Rotor des Elektromotors koaxial gekuppelt ist.

Motorpumpenaggregate, die im Prinzip aus einem mit einer Kreislaspumpe zu einer konstruktiven Einheit zusammengebauten Elektromotor bestehen, sind in einer Reihe von Ausführungsformen bekannt. Einzelne dieser Ausführungsformen sind mit hermetisch abgeschlossenen Gehäusen für den Elektromotor ausgebildet, so daß sie für Unterwasserbetrieb geeignet sind. Insbesondere Motorpumpenaggregate kleiner Leistung, wie sie beispielsweise für Aquarienzwecke und dgl. verwendet werden, sollen sich bei absoluter Betriebssicherheit durch einen kleinen Platzbedarf, einfache Herstellungsmöglichkeiten und leichte Wartung auszeichnen. Dazu ist es erforderlich, daß die Lagerung des Rotors keine allzu großen Anforderungen hinsichtlich der Genauigkeit an die Fertigung stellt, während andererseits über lange Zeiträume ein wartungsfreier Betrieb gewährleistet sein muß.

DAN ORIGINAL

Ein Motorpumpenaggregat mit einer Lagerung zu schaffen, die diesen Anforderungen genügt, ist Aufgabe der Erfindung.

Zur Lösung dieser Aufgabe ist das Motorpumpenaggregat gemäß der Erfindung dadurch gekennzeichnet, daß der Rotor des Motors in einer sich nach außen öffnenden in dem Luftspalt zwischen Stator und Rotor liegenden zylindrischen, topfartigen Büchse drehbar gelagert ist, die mit einem den Stator des Motors aufnehmenden Gehäuse abgedichtet verbunden ist und daß der Rotor in zwei elastische aufgehängten Lagern gelagert ist, von denen eines im Boden der zylindrischen Büchse und das andere in einer lösbar auf das den Stator enthaltende Gehäuse aufgesetzten Pumpenkammerabdeckung angeordnet ist.

Die Anordnung kann hierbei vorteilhafterweise derart getroffen sein, daß der Rotor mit dem Pumpenrad auf einer durchgehenden Achse drehbar gelagert ist, die endseitig in Gummitüllen aufgenommen ist.

Die Gummitüllen ergeben einen sehr ruhigen Lauf des Rotors und des Pumpenrades, da sie eine Resonanzabsorption bewirken. Dies ist insbesondere für solche Pumpenaggregate von Bedeutung, die zum Einsatz in Wohnräumen, beispielsweise für Aquarien, bestimmt sind.

Zur Erleichterung der Montage ist es hierbei zweckmäßig, wenn die endseitig verschlossenen Gummitüllen in entsprechende Öffnungen des Bodens der zylindrischen Büchse und der Pumpenkammerabdeckung von außen her eingefügt und mittels angeformter Schultern oder dgl. darin verastet sind. Die Gummitüllen weisen mit Vorteil endseitig jeweils einen angeformten Greifansatz für eine Zange oder dgl. Werkzeug auf, der es gestattet, die Gummitüllen einfach von innen nach außen in ihre zugeordneten Öffnungen mittels einer Zange einzuziehen.

Schließlich ist es zur Erzielung einer ausgeglichenen Radialbelastung und damit eines günstigen Einflusses auf die Laufruhe sowie die Herabsetzung des Verschleisses von Lagern und Drehachse zweckmäßig, wenn das Pumpenrad drei symmetrisch längs des Umfanges der Pumpenkammer verteilte Pumpenauslässe aufweist, wobei die Pumpenkammerabdeckungen koaxial zur Drehachse angeordneten Ansaugstutzen trägt, in dem ein das eine Achslager tragender Lagerstern sitzt.

Weitere vorteilhafte Merkmale und Eigenschaften des neuen Pumpenaggregates ergeben sich aus der nachfolgenden Beschreibung eines Ausführungsbeispiels des Gegenstandes der Erfindung sowie aus den anschließenden Unteransprüchen.

In der Zeichnung ist ein Ausführungsbeispiel des Gegenstandes der Erfindung dargestellt. Es zeigen:

Fig. 1 Ein Pumpenaggregat gemäß der Erfindung, geschnitten längs der Linie I-I der Fig. 2 in einer Seitenansicht,

Fig. 2 das Pumpenaggregat nach Fig. 1 in der Draufsicht,

Fig. 3 das Pumpenaggregat nach Fig. 1, teilweise geschnitten längs der Linie III-III der Fig. 1 in der Draufsicht,

Fig. 4 das Pumpenaggregat nach Fig. 1 in einer Seitenansicht,

Fig. 5 den Stator des Pumpenaggregates nach Fig. 1 in perspektivischer Darstellung,

Fig. 6 die Polschuhe des Stators nach Fig. 5 in der Abwicklung und in der Draufsicht und

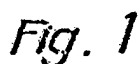
Fig. 7 den Spulenkörper und den Stator des Pumpenaggregats nach Fig. 1 im Querschnitt, in einer Seitenansicht.

Patentansprüche

1. Motorpumpenaggregat mit einem in einem Kunststoffgehäuse angeordneten Elektromotor und einem in einer an dem Motorgehäuse angeformten Pumpenkammer umlaufenden Pumpenrad, das mit dem in zwei fluchten Lagern drehbar gelagerten Rotor des Elektromotors koaxial gekuppelt ist, dadurch gekennzeichnet, daß der Rotor (4) des Motors (1) in einer sich nach außen öffnenden, in dem Luftspalt zwischen Stator (5) und Rotor (4) liegenden zylindrischen, topfartigen Büchse (7) drehbar gelagert ist, die mit einem den Stator (5) des Motors aufnehmenden Gehäuse (6) abgedichtet verbunden ist und daß der Rotor (4) in zwei elastische aufgehängten Lagern (30) gelagert ist, von denen eines im Boden der zylindrischen Büchse (7) und das andere in einer lösbar auf das den Stator (5) enthaltende Gehäuse (6) aufgesetzten Pumpenkammerabdeckung (33) angeordnet ist.
2. Motorpumpenaggregat nach Anspruch 1, dadurch gekennzeichnet, daß der Rotor (4) mit dem Pumpenrad (3) auf einer durchgehenden Achse (29) drehbar gelagert ist, die endseitig in Gummitüllen (30) aufgenommen ist.
3. Motorpumpenaggregat nach Anspruch 2, dadurch gekennzeichnet, daß die endseitig verschlossenen Gummitüllen (30) in entsprechende Öffnungen (31, 32) des Bodens der zylindrischen Büchse (7) und der Pumpenkammerabdeckung (33) von außen her eingefügt und mittels angeformter Schultern (35, 36) oder dgl. darin verrastet sind.
4. Motorpumpenaggregat nach Anspruch 3, dadurch gekennzeichnet, daß die Gummitüllen (30) endseitig jeweils

einen angeformten Greifansatz (34) für eine Zange oder dgl. Werkzeug aufweisen.

5. Motorpumpenaggregat nach Anspruch 1, dadurch gekennzeichnet, daß dem Pumpenrad (3) drei symmetrisch längs des Umfanges der Pumpenkammer (2) verteilte Pumpenauslässe (45) zugeordnet sind und die Pumpenkammerabdeckung (33) einen koaxial zur Drehachse (9) angeordneten Ansaugstutzen (46) trägt, in dem ein das eine Achslager (30) tragender Lagerstern (47) sitzt.



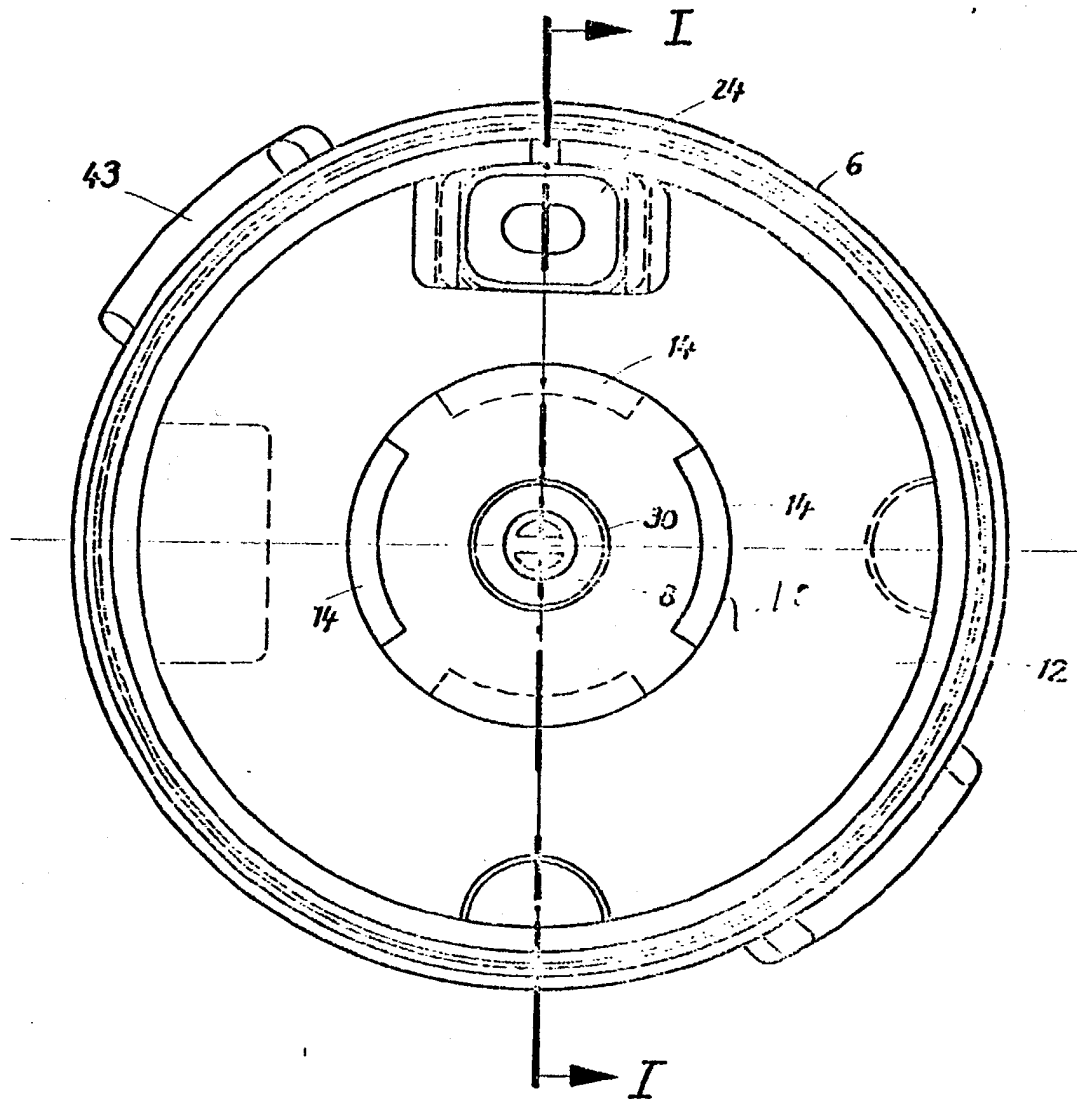


Fig. 2

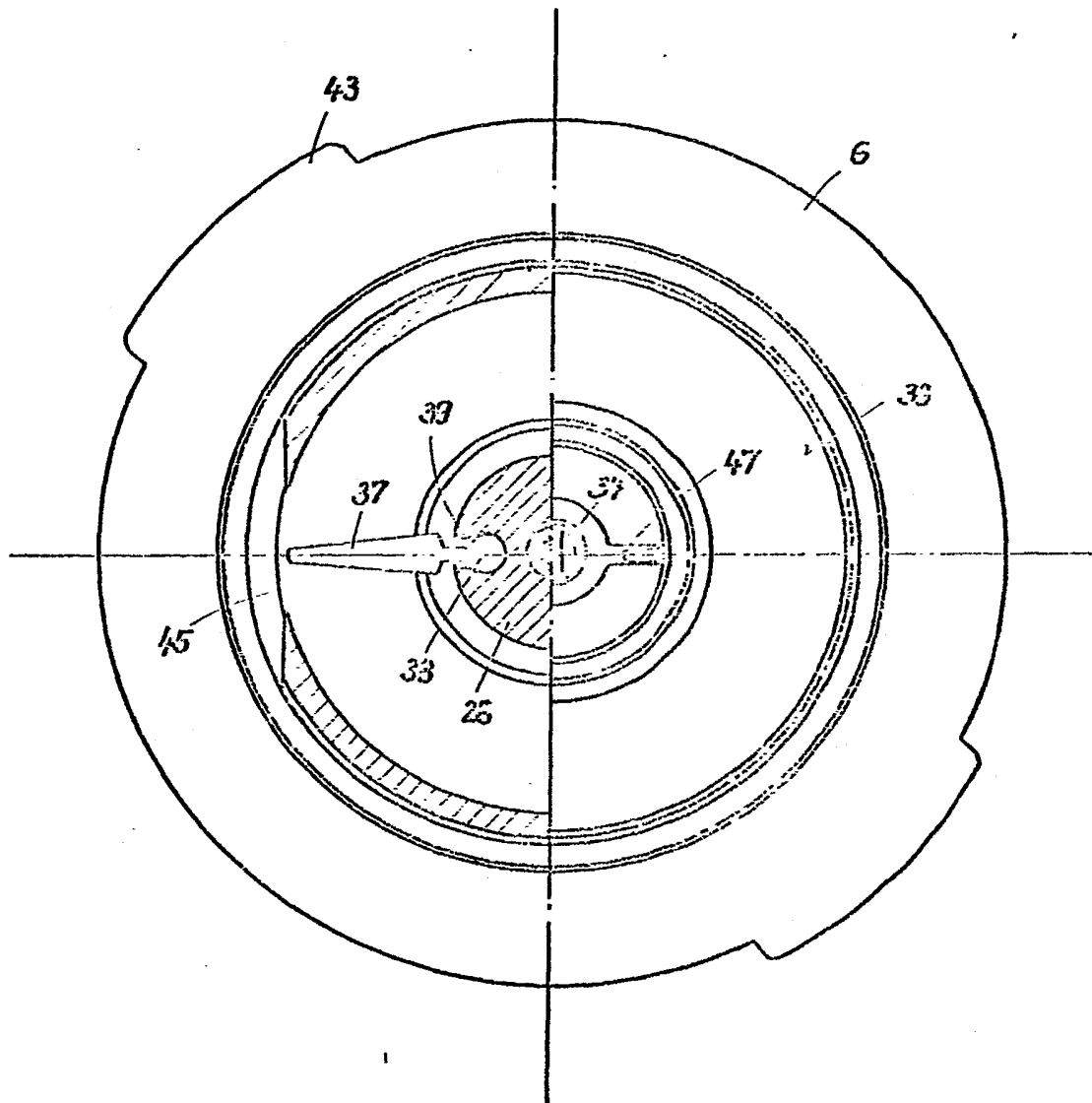


Fig. 3

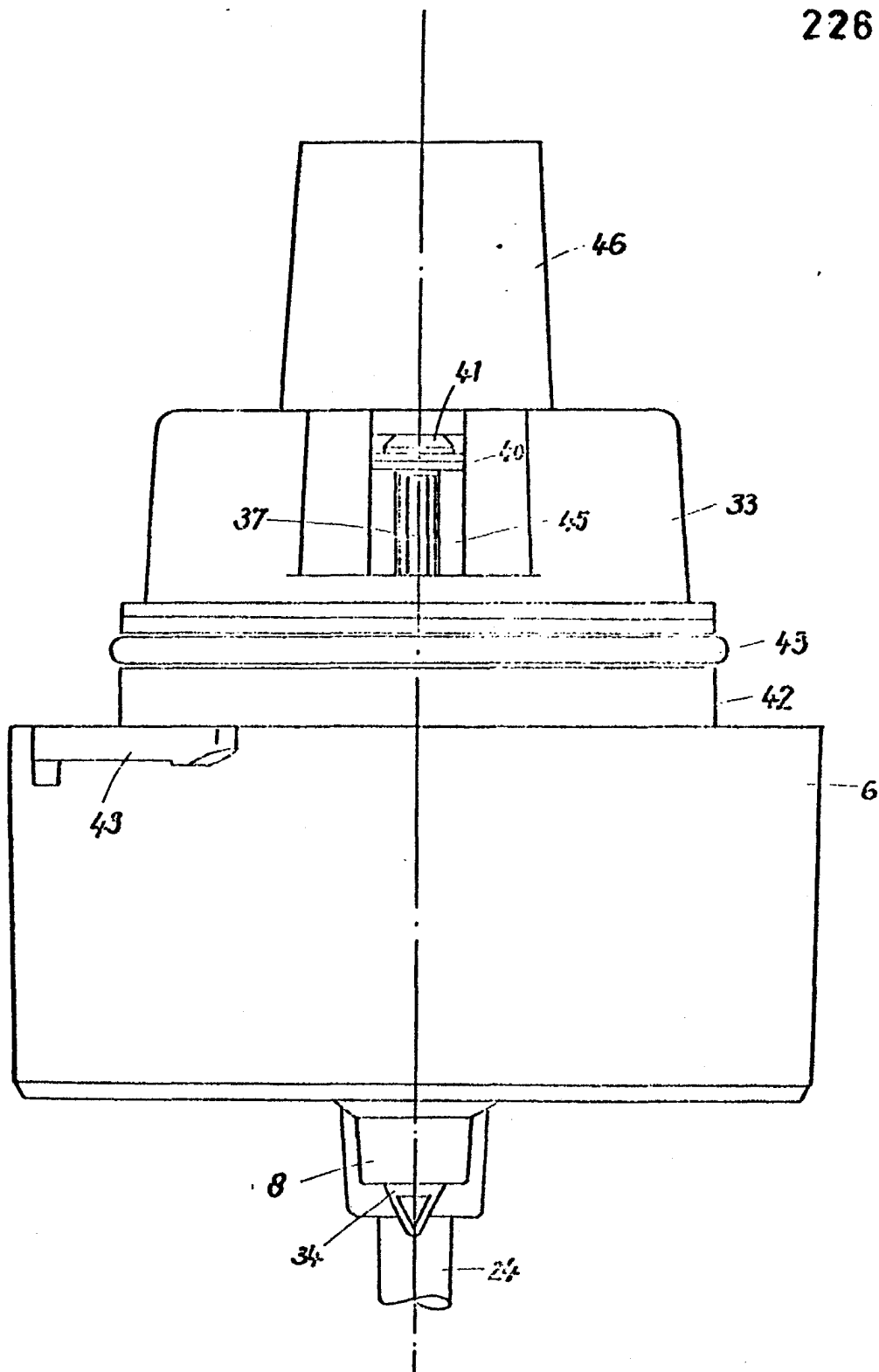


Fig. 4

Fig. 5

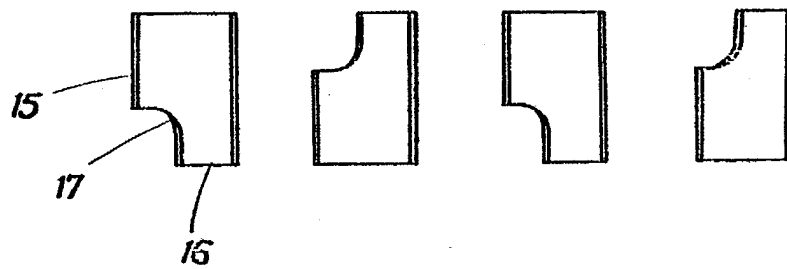
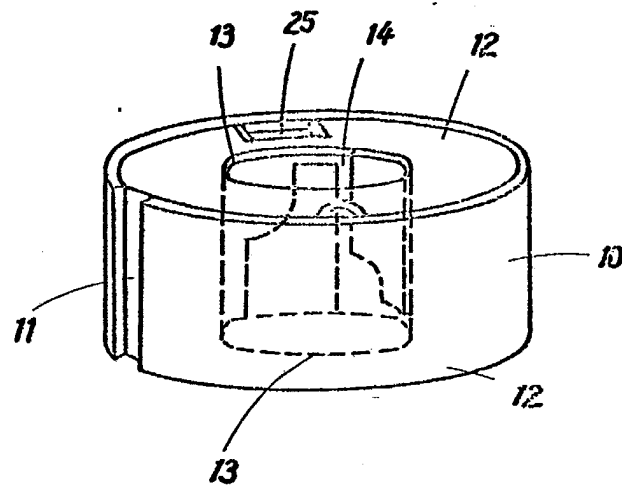


Fig. 6

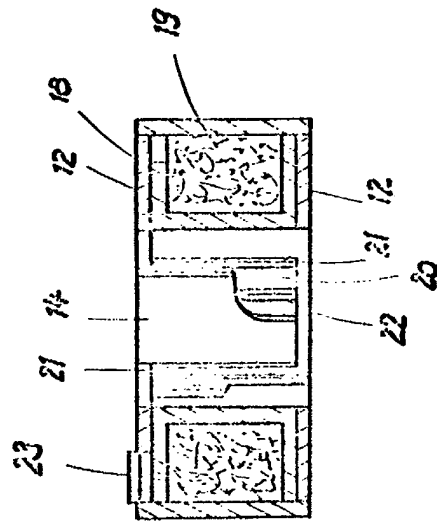


Fig. 7

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Number of the earlier application from, which the present document has been divided: P 22 45 009.5

Applicant: Gunther[sic] Eheim

Inventor: has requested not to be mentioned

BEARING ARRANGEMENT OF THE ROTOR OF A MOTOR-DRIVEN PUMP UNIT

The invention pertains to a motor-driven pump unit, having an electric motor, arranged in a plastic housing, and a pump impeller, revolving in a pump chamber, designed on the motor housing, which impeller is coaxially coupled to the rotor of the electric motor, which is pivoted on two aligned bearings.

Motor-driven pump units, which as a rule consist of an electric motor, assembled with a centrifugal pump [rotary pump] into a structural unit, are known in a series of embodiment forms. Single units of these embodiment forms are designed as having hermetically sealed housings for the electric motor so that they are suitable for underwater operation. In particular, motor-driven pump units of small output, as e.g., those used for

aquarium purposes and similar, should be characterized - while an absolute operational reliability is provided - by small floor-space requirement, possibility for a simple manufacturing, and simple maintenance. To this end, it is necessary that the bearing arrangement of the rotor does not claim far too high requirements - as far as accuracy is concerned - to the manufacturing while , on the other hand, a maintenance-free operation would be guaranteed over long periods of time.

The objective of this invention is to create a motor-driven pump unit, having a bearing support, which satisfies these requirements.

In order for the objective thus set to be achieved, the motor-driven pump unit in accordance with the invention is characterized in that the rotor of the motor is rotatably supported in a cylindrical, pot-shaped bushing, opening outwards, and located in the air gap between stator and rotor, which bushing is connected in a hermetically sealed manner to a housing, accommodating the stator of the motor, and that the rotor is supported in two elastically suspended bearings, one of which is arranged in the bottom of the cylindrical bushing, and the other one in a pump-chamber covering, detachably mounted on the housing, containing the stator.

In doing so the arrangement can advantageously be materialized in such a way that the rotor together with the pump impeller is rotatably supported or pivoted on a continuous axle, which is accommodated on the end-side in rubber sockets.

The rubber sockets produce a very quiet operation of the rotor and the pump impeller due to the fact that the said sockets bring about a resonance absorption. In particular, this is important for such pump units, which are intended to be used in living premises, e.g., for aquaria.

In order for the installation to be facilitated, it is - in doing so - expedient or functional when the rubber sockets, which are sealed on the end side, are inserted from outside in corresponding openings of the bottom of the cylindrical bushing and the pump covering, and arrested by means of shaped shoulders or similar therein. On the end side, the rubber sockets advantageously have a shaped gripping attachment or fixture for pliers or a similar tool, which allows to pull simply by means of pliers the rubber sockets from inside outside in their assigned openings.

Finally, in order for a compensated or balanced radial loading to be attained, and, therewith a favorable influence upon the running smoothness, as well as a reduction of the wear of the bearings and rotating axle, it is functional or expedient when the pump impeller has three pump outlets, symmetrically distributed along the circumference of the pump chamber whereby the pump-chamber covering supports a suction connection or short pipe, coaxially arranged with respect to the rotating axle, in which suction connection or intake stub, there is located a bearing bracket, in which a bearing bracket, supporting one of the axial boxes[bearings] is fixed.

Additional and advantageous features and properties of the new pump unit ensue from the following description of an exemplified embodiment of the object of the invention as well as from the subsequent subclaims.

An exemplified embodiment is diagrammatically represented in the drawing wherein:

Fig. 1 is a side view of a pump unit in accordance with the invention, cut along line I - I of Fig. 2,

Fig. 2 is a top view of the pump unit, depicted in Fig. 1,

Fig. 3 is a top view of the pump unit, depicted in Fig. 1, partially cut along line III - III of Fig. 1,

Fig. 4 is a side view of the pump unit, depicted in Fig. 1,

Fig. 5 is a perspective of the stator of the pump unit, depicted in Fig. 1,

Fig. 6 shows a top view and a development of the pole shoes of the stator, depicted in Fig. 5,

Fig. 7 shows a side view of the bobbin (solenoid) and the stator of the pump unit, depicted in Fig. 1 in a cross-section.

Patent Claims

1. Motor-driven pump unit, having an electric motor, arranged in a plastic housing, and a pump impeller, revolving in a pump chamber, designed on the motor housing, which pump impeller is coaxially coupled to the rotor of the electric motor, supported rotatably [pivoted] in two aligned bearings, characterized in that the rotor (4) of the motor (1) is rotatably

supported [pivoted] in a cylindrical, pot-shaped bushing (7) which is opening outward, and is located in the air gap between stator(5) and rotor (4), which bushing is connected in a hermetically sealed manner to the housing (6), accommodating the stator (5) of the motor, and that the rotor (4) is supported in two elastically suspended bearings (30), one of which is arranged in the bottom of the cylindrical bushing (7) and the other one is arranged in a pump-chamber covering, detachably mounted upon the housing (6), containing the stator (5).

2. Motor-driven pump unit as claimed in claim 1, characterized in that the rotor (4) together with the pump impeller (3) is rotatably supported [pivoted] on a continuous axle (29), which is accommodated on the end-side in rubber sockets (30).

3. Motor-driven pump unit as claimed in claim 2, characterized in that the rubber sockets (30), sealed on the end-side are inserted from outside into corresponding openings (31, 32) of the bottom of the cylindrical bushing (7) and of the pump-chamber covering, and are arrested therein by means of shaped shoulders (35, 36) or similar.

4. Motor-driven pump unit as claimed in claim 3, characterized in that on the end side, the rubber sockets (30) have shaped gripping attachment or fixture (34) for pliers or a similar tool.

5. Motor-driven pump unit as claimed in claim 1, characterized in that three pump outlets (45), which are

symmetrically distributed along the circumference of the pump chamber (2) are assigned to the pump impeller (3), and the pump chamber covering (33) supports a suction connection [intake stub] (46), coaxially arranged to the rotatable axle (9), in which suction connection there is fixed a bearing bracket (47), supporting one of the axle boxes (bearings) (30).

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John M Koytcheff
April 23, 2002

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Additional and advantageous features and properties of the new pump unit ensue from the following description of an exemplified embodiment of the object of the invention as well as from the subsequent subclaims.

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2. Motor-driven pump unit as claimed in claim 1, characterized in that the rotor (4) together with the pump impeller (3) is rotatably supported [pivoted] on a continuous axle (29), which is accommodated on the end-side in rubber sockets (30).

3. Motor-driven pump unit as claimed in claim 2, characterized in that the rubber sockets (30), sealed on the end-side are inserted from outside into corresponding openings (31, 32) of the bottom of the cylindrical bushing (7) and of the pump-chamber covering, and are arrested therein by means of shaped shoulders (35, 36) or similar.

4. Motor-driven pump unit as claimed in claim 3, characterized in that on the end side, the rubber sockets (30) have shaped gripping attachment or fixture (34) for pliers or a similar tool.

5. Motor-driven pump unit as claimed in claim 1, characterized in that three pump outlets (45), which are

symmetrically distributed along the circumference of the pump chamber (2) are assigned to the pump impeller (3), and the pump chamber covering (33) supports a suction connection [intake stub] (46), coaxially arranged to the rotatable axle (9), in which suction connection there is fixed a bearing bracket (47), supporting one of the axle boxes (bearings) (30).

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John M Koytcheff
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